NGO comments on Briefing Paper: HFCs and HFC alternatives in split air conditioning systems.

The Environmental Investigation Agency (EIA) submits on behalf of Climate Action Network Europe, Climate Advisers Network, Deutsche Umwelthilfe e.V. (DUH), ECODES, ECOS, European Environmental Bureau (EEB) and Associação Sistema Terrestre Sustentável (ZERO) the following comments and questions on the March 2020 draft technical paper produced by Őko-Recherche.

General Comments

Fast action on potent short-lived greenhouse gas emissions has never been more necessary. Rapid global warming is bringing us perilously close to reaching critical climate tipping points. The forthcoming review of the EU F-Gas Regulation should therefore be undertaken with a view to enabling the transition away from climate-damaging hydrofluorocarbons (HFCs) to be undertaken as quickly as possible. This means drafting legislation that will maximise the uptake of alternatives with the lowest possible Global Warming Potentials (e.g. GWP ≤ 10 or alternatives without refrigerant) in all key sectors.

The split air-conditioning sector is an important sector, representing an estimated 30% of global HFC emissions on a CO_2-equivalent basis.[1]

The table on page 4 that outlines feasible refrigerants demonstrates clearly that R290 is the key alternative refrigerant available for split air-conditioning. The only alternative to R410A refrigerant with market readiness is HFC-32, which is not low-GWP having a 20-year GWP of 2430 and 100-year GWP of 675.

Scope of the briefing

The briefing paper considers that "single-split equipment containing charges of HFC refrigerant <3kg" to relate to cooling capacities of <12kW. We note that this scope is based on 3kg HFC-410A, while 3kg of HFC-32 would enable higher cooling capacities to be reached.

Accepting that the scope of the briefing document is single-split ACs with cooling capacities in the range up to 12kW, we found the technical feasibility and market overview sections quite limited in detail related to the scope.

Technical Feasibility

The briefing should be careful to distinguish between technical feasibility versus other barriers to market adoption, such as outdated standards like EN378 and IEC 60335-2-40. Thus, when discussing the "feasibility for different types of split A/C" in the table on page 4, the briefing should be clear that R290, R161 and R1270 are technically feasible in all types of split A/C and so listed (unless the

[1] http://esmap.org/sites/default/files/events-files/Int%20Conf%20Sust%20Cooling/PhilDenzinger-%202018%20Natural%20Refrigerants%20GIZ%20Proklima%20final_Optimized.pdf

author has specific information on their lack of technical feasibility). Reference should also be made to the work of the EU Standardisation Request M/555 that supports the removal of barriers in existing standards to market adoption of flammable refrigerants.

In particular, there is lack of information regarding the potential for R290 single split air-conditioning models in the 7-12kW range. In the table on page 4 related to R290 it states: "*Single split currently up to 7kW. Potential also for larger single & multi-splits if increase of charge limits in standards*". There is a further comment in the text, presumably also related to R290 that: "*A further significant reduction of GWP of the alternatives to e.g. below 150 may be possible in all small single split systems in the medium term*". It is our understanding that single-split systems relying on R290 above 7kW are technically feasible.[2] Given that an increase in charge limit for R290 under IEC 60335-2-40 and EN-378 is expected in the near future, we would expect an analysis of the application of R290 in the entire range up to 12kW, including an estimated date for potential 100% market uptake in new systems.

We also note that, while the scope of the exercise is to look at "cost-effective, technically feasible, energy-efficient and reliable alternatives", there is no reference to cost-effectiveness in the table on page 4.

Regarding the same table, we are not aware of anything in the literature to support the statement under "Relevant use restrictions" for R-1270, and therefore request supporting literature for this statement.

Market Overview and Trends

Figure 1 outlines refrigerants in imported stationary refrigeration and A/C equipment. The briefing notes that R32, which is used mostly in A/C, has increased significantly, however no information is given to disaggregate imported single-split A/C units from all other refrigeration and A/C equipment. Given that the technical paper relates to single-split A/C, information specifically related to imported single-split A/C units would be more relevant.

While market trends are discussed, the information is incomplete and does not allow a clear picture across the EU. For example, the briefing states: "*In most countries a market share of more than 80% [of R32] has been reached in 2019."* It further notes, however, that Italy and Spain are "*somewhat lagging behind other EU countries*". Given that Italy and Spain are the two largest markets in the EU for single-split A/C (2018 demand 845,000 and 528,000 units respectively according to one source[3]), their impact on overall EU market share of different refrigerants could be significant. It is therefore important to have a more detailed market share analysis. Likewise, it is reported that France, the third largest market for single splits in the EU, still has some constraints on the use of A2L and A3 refrigerants and that about 60% of split systems in 2019 were using R32. It would be useful to have a Member State by Member State analysis detailing the number of units placed on the market, the refrigerants used and expected future trends, as well as overall EU figures.

The briefing also states that product standards and building codes still unnecessarily prohibit the uptake of flammable refrigerants in a few Member States, with specific reference to building codes and installation requirements in Spain and Italy that have been changed in the last 2-3 years to facilitate the use of flammable refrigerants. It is not clear if these changes apply to all flammable refrigerants (A2, A2L, A3) or just A2L. Given the transitionary nature of R32, the technical briefing should focus on barriers to low-GWP refrigerants.

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[2] See for example, UNDP - INDUSTRIAS THERMOTAR LTDA. – Demonstration project for HCFC-22 phase-out in the manufacturing of commercial air-conditioning equipment.

[3] https://www.jraia.or.jp/english/World_AC_Demand.pdf

In addition to product standards and building codes, the report should note the lack of trained personnel to install, operate, service, repair and decommission equipment with flammable refrigerants (A2L, A2, A3). The revised F-Gas Regulation should include requirements for training of personnel in all replacements for fluorinated gases.

Alternatives in the Pipeline

This section should also refer to the potential environmental and safety concerns posed by HFO refrigerants, in particular regarding the breakdown product of trifluoroacetic acid (TFA).[4]

Conclusion

While additional research and data is required to better understand the market and technical potential for R290, the briefing does make clear that indeed, "cost-effective, technical feasible, energy-efficient and reliable alternatives" to F-Gases do exist in small split air conditioning systems. Based on even the limited analysis, it is clear that the date of the Annex III placing on the market (POM) prohibition in 2025[5] can be brought forward to a more immediate date, and that the GWP limit can be lowered to the GWP of propane (3) for capacities up to 7 kW or likely much higher.

In our view, the briefing would benefit from a specific section on the lost decade in single-split systems. Following a comprehensive review of each subsector, the Commission-funded *Preparatory Study* (2011) and the Commission-published *Impact Assessment* (2012) concluded that a full transition to safe and energy-efficient very low-GWP alternatives, that included R290, was both cost-effective and technically feasible in all single-split systems, both large and small, by 2020.[6] According to the Impact Assessment, the emission reductions from a POM ban in this sector were the highest of any sector. Yet the F-Gas Regulation as proposed (2012) and adopted (2014) did not contain a ban on single-split systems with GWP of 150 or more in Annex III. It is now 2020 and the briefing is discussing a subsector that should have mostly transitioned to truly low-GWP alternatives but has not. Almost a decade has been lost. Instead, single-split systems relying on HFC-32 are now dominant, despite only being expected to achieve a penetration of 30% of the marketplace by 2020.[7] This underscores how the failure to legislate and to address other barriers, such as an safety standards and training, can have a disproportionate effect on market penetration of climate-friendly alternatives.

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[4] Fleet *et al*. (2017). Study on environmental and health effects of HFO refrigerants (Publication number: M-917|2017) https://www.miljodirektoratet.no/globalassets/publikasjoner/M917/M917.pdf

[5] Single split air-conditioning systems containing less than 3 kg of fluorinated greenhouse gases, that contain, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 750 or more

[6] *Preparatory Study*, Annex V, p. 254; *Impact Assessment*, pp. 117, 173 and 241-254.

[7] *Preparatory Study*, Annex V, p. 254.